



Docket No.: ARCD: 394US
Serial No.: 10/827,114
Inventor(s): Frank et al.
Title: Heat Transfer Probe
REPLACEMENT SHEET

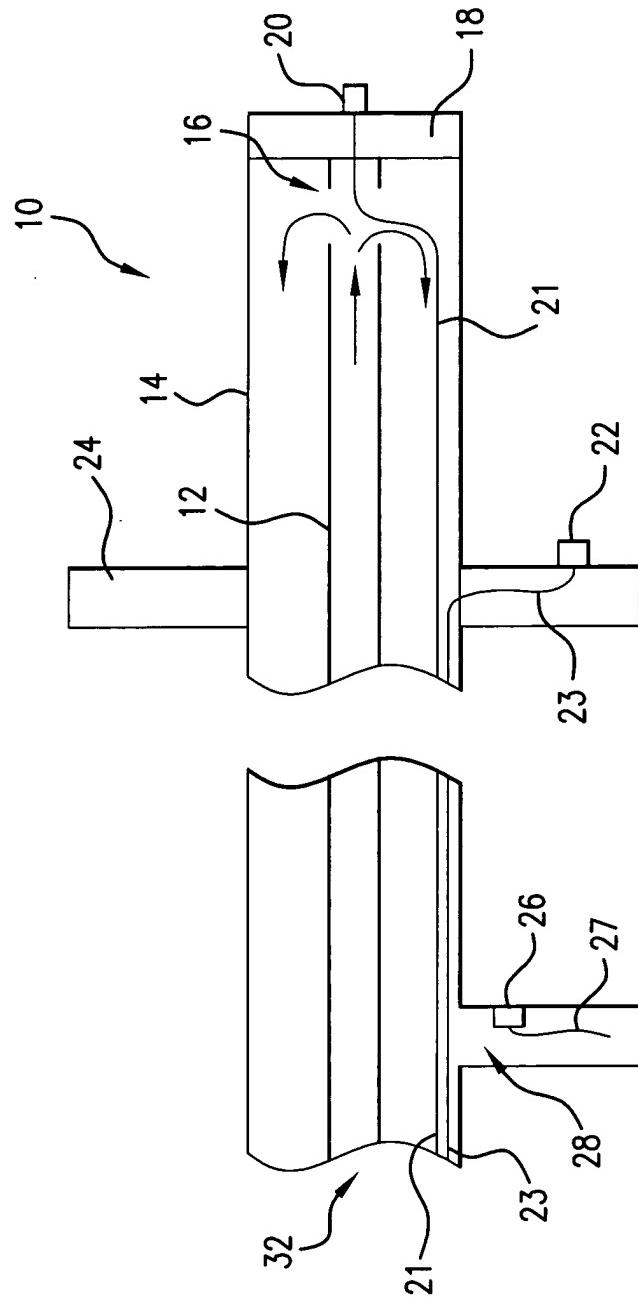


FIG. 1

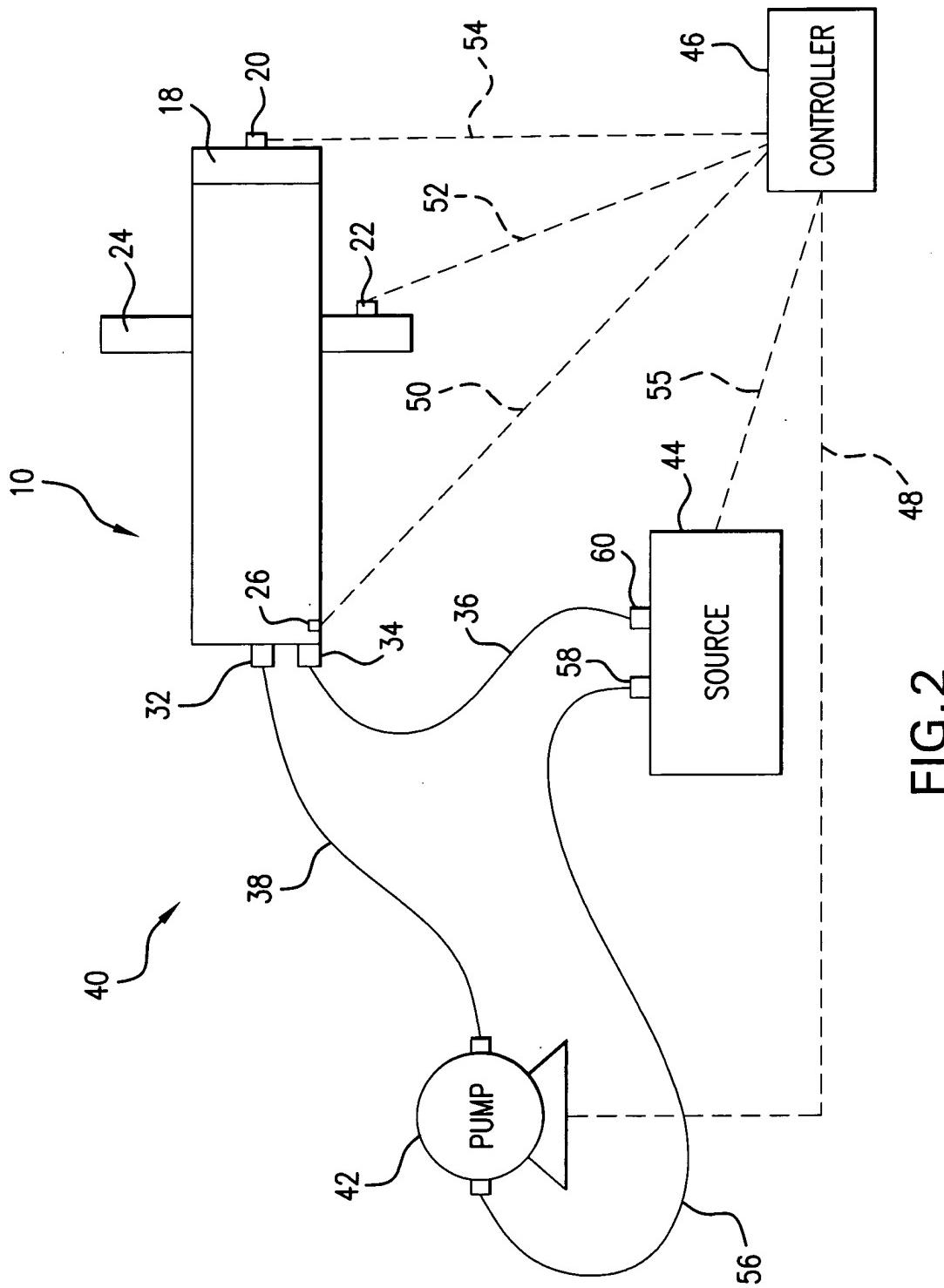


FIG. 2

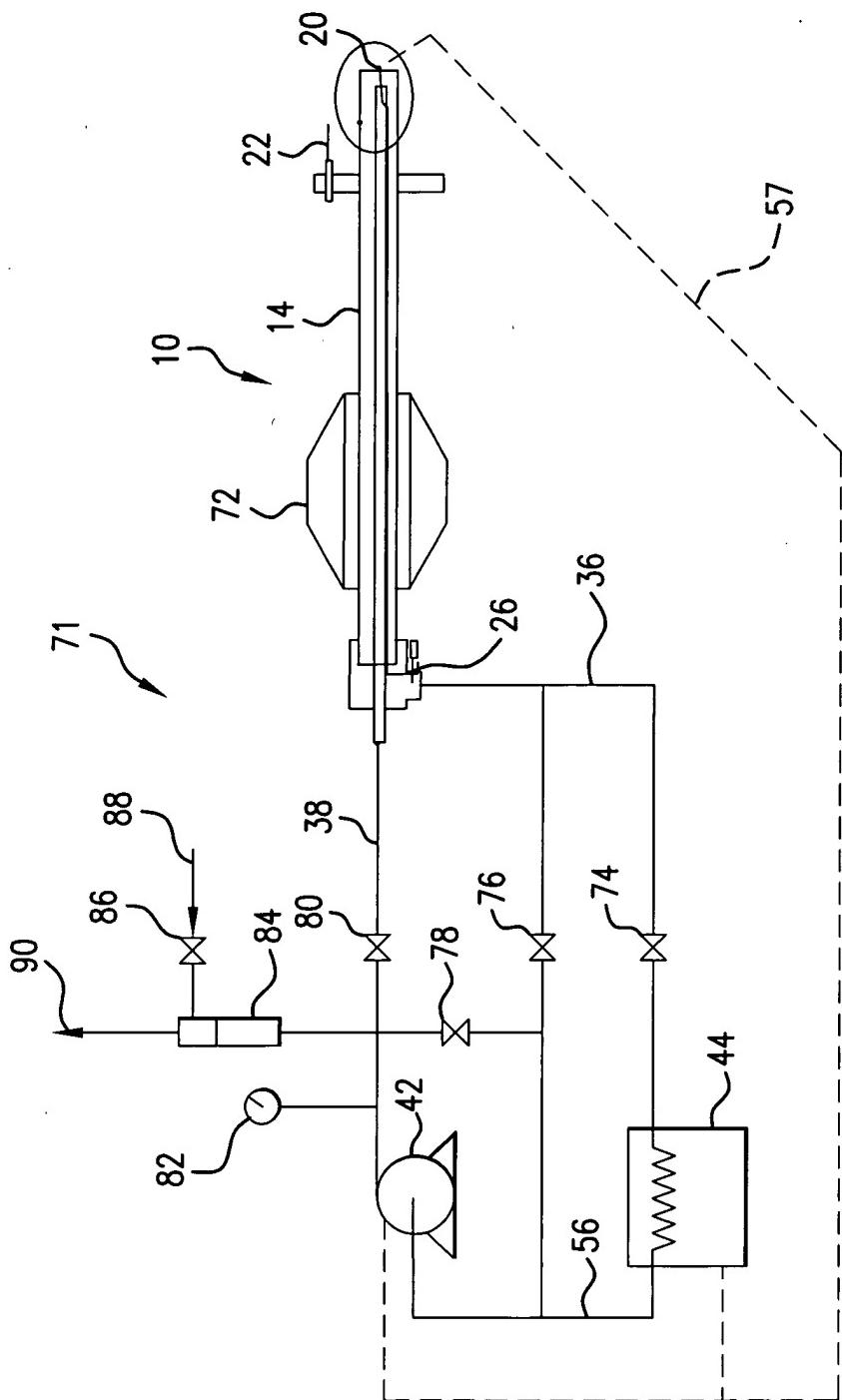


FIG. 3

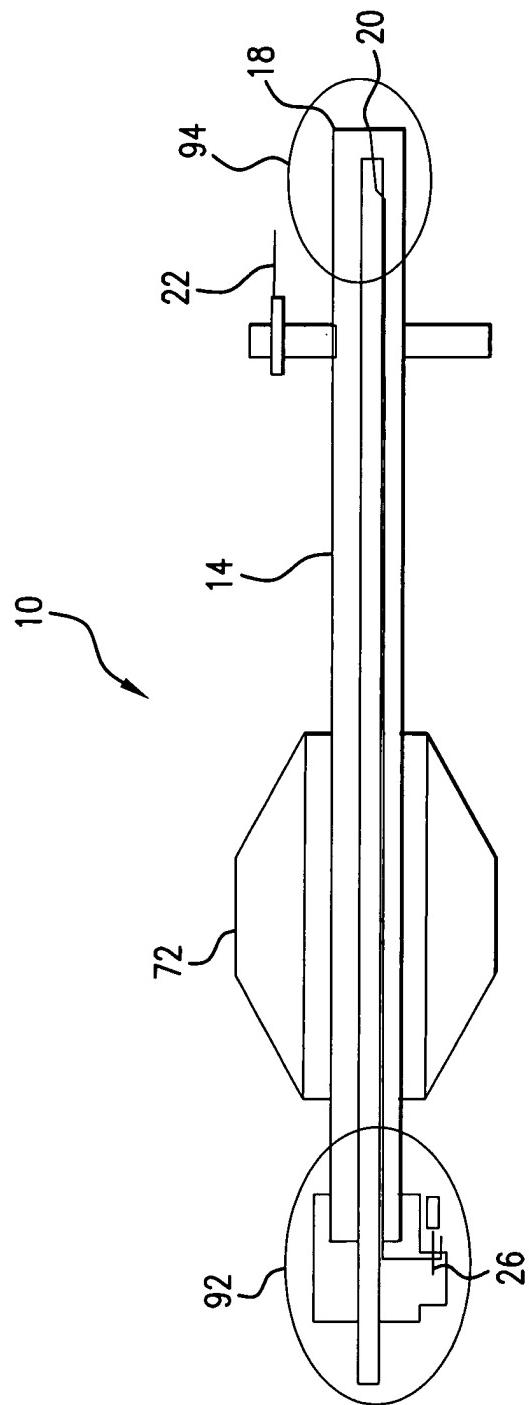


FIG. 4

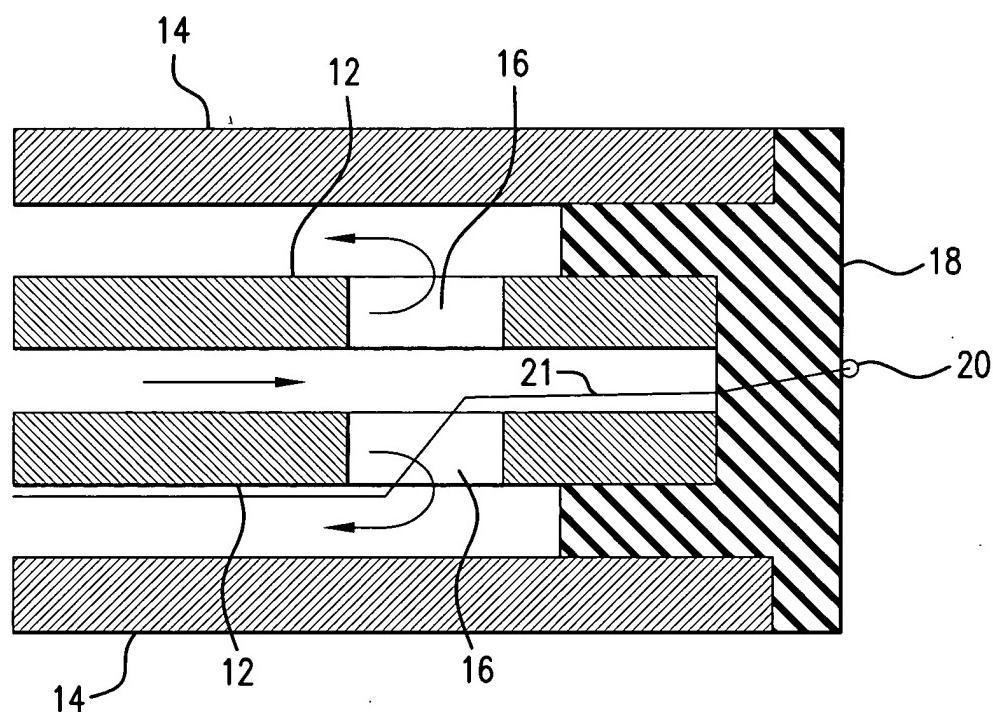


FIG.5

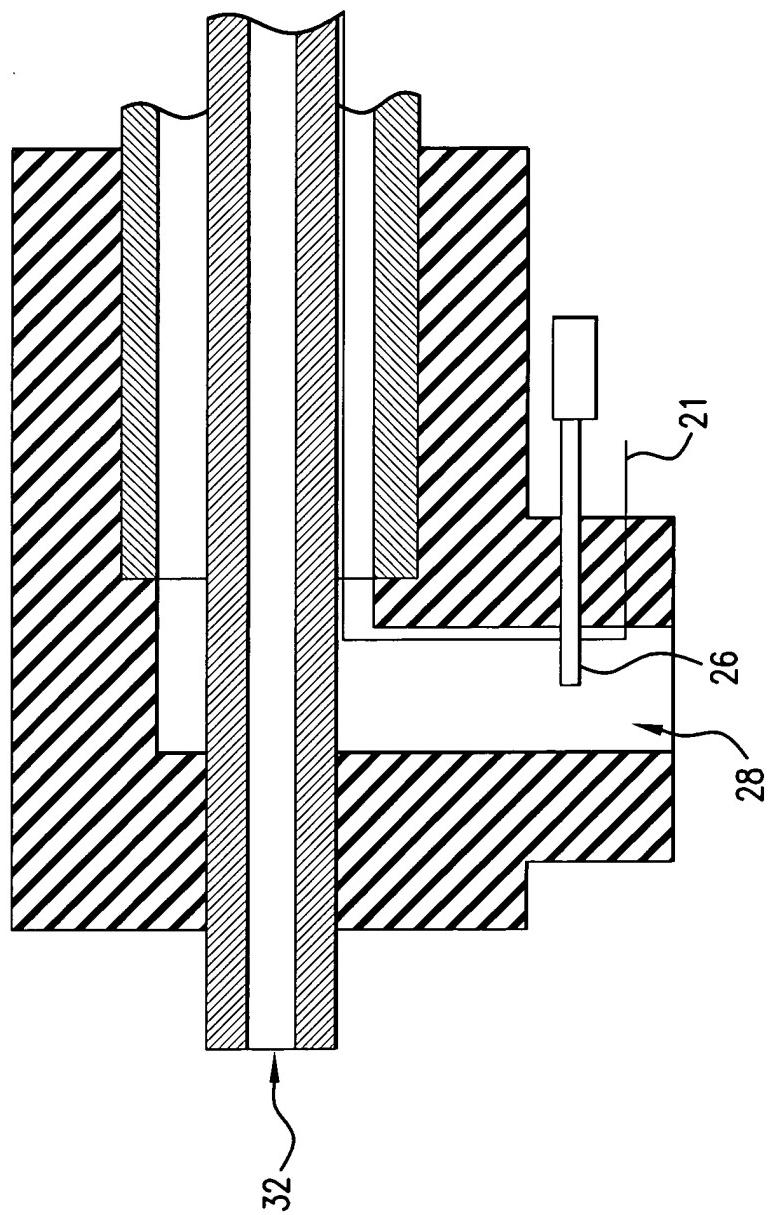


FIG. 6

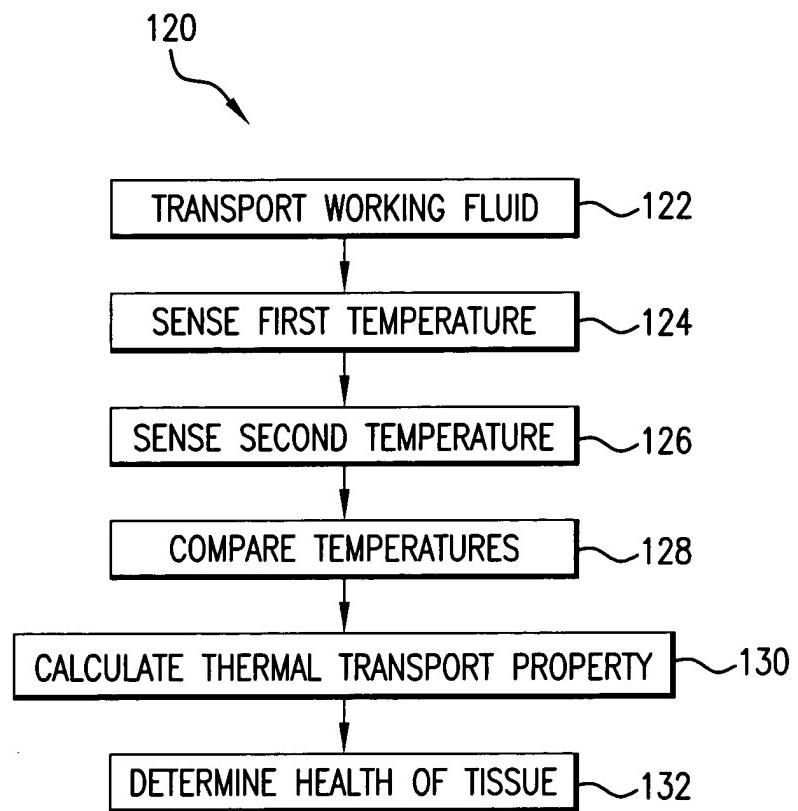


FIG.7

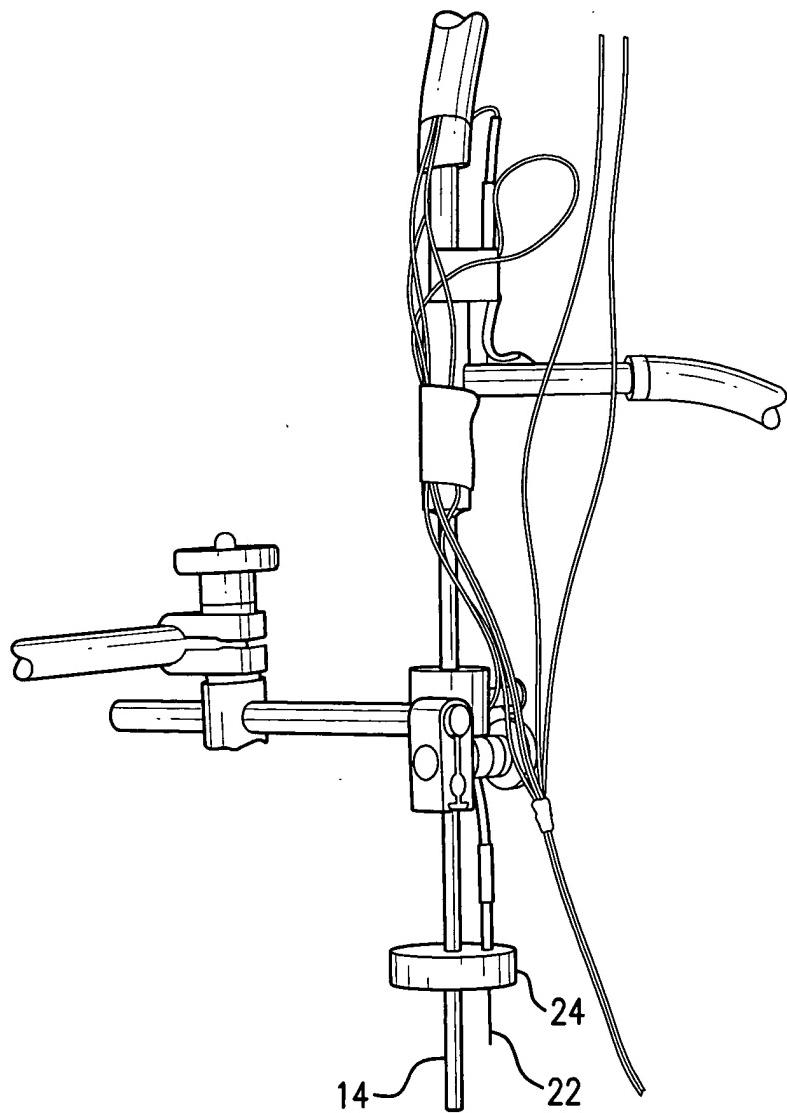
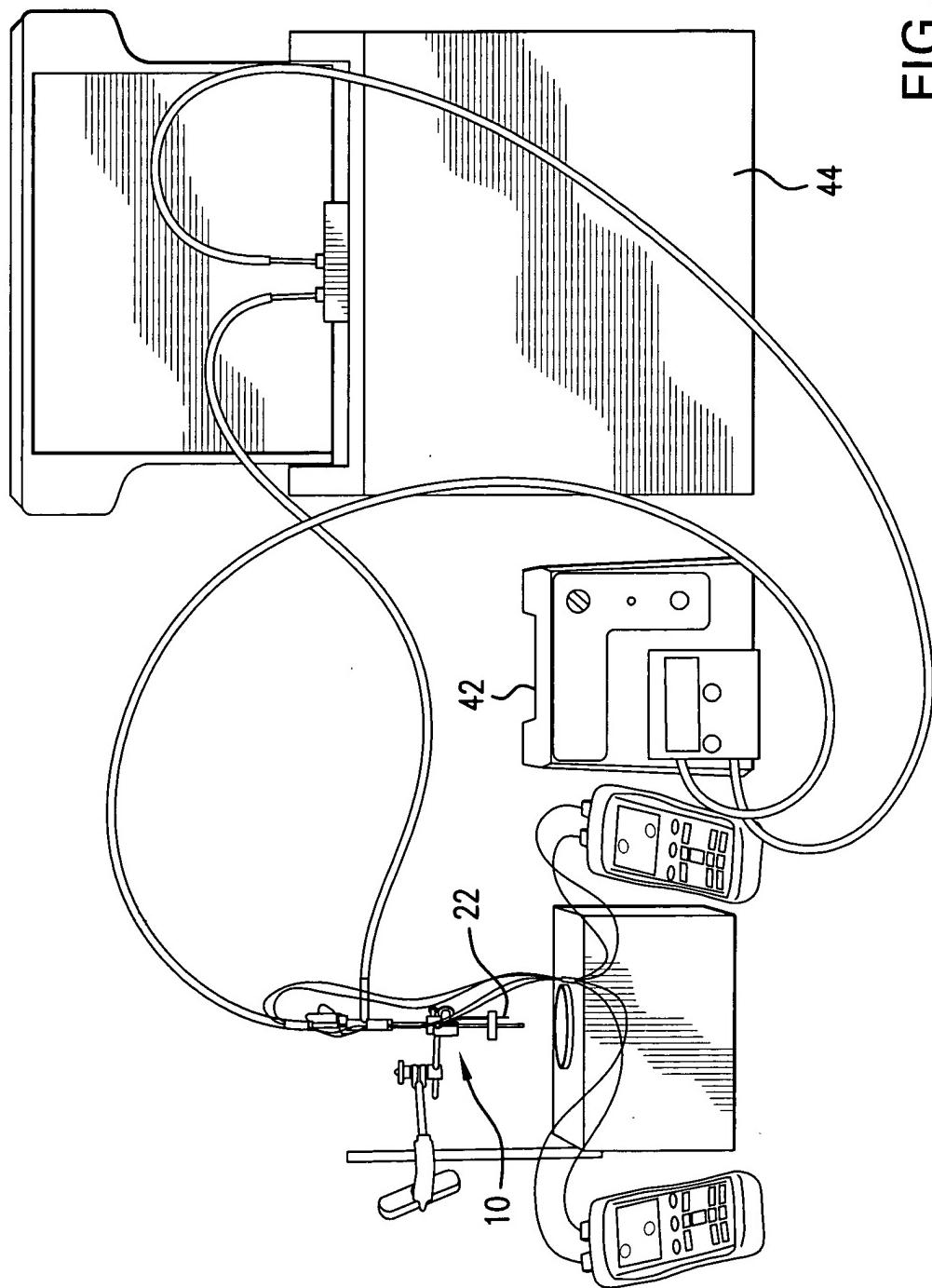


FIG. 8

FIG. 9



Water Properties @ 30C				
ρ (kg/m ³)	C_p (J/kg-K)	μ (Pa-s)	K (W/m-K)	
996	4180	0.000797	0.617	
		Coolant inlet temperature (C)=	25	20
		Coolant outlet temperature (C)=	37	30
		Flow rate (mL/min)=	170	170
		Maximum cooling capacity (W)= $m \cdot C_p^* (T_{out} - T_{in})$ =	141.55	58.98
				200.53
				117.96
Brain Properties @ 30C				
ρ (kg/m ³)	C_p (J/kg-K)	μ (Pa-s)	K (W/m-K)	
1080	3850	0.5	0.5	
		Temperature drop (C)=	5	5
				5
				5

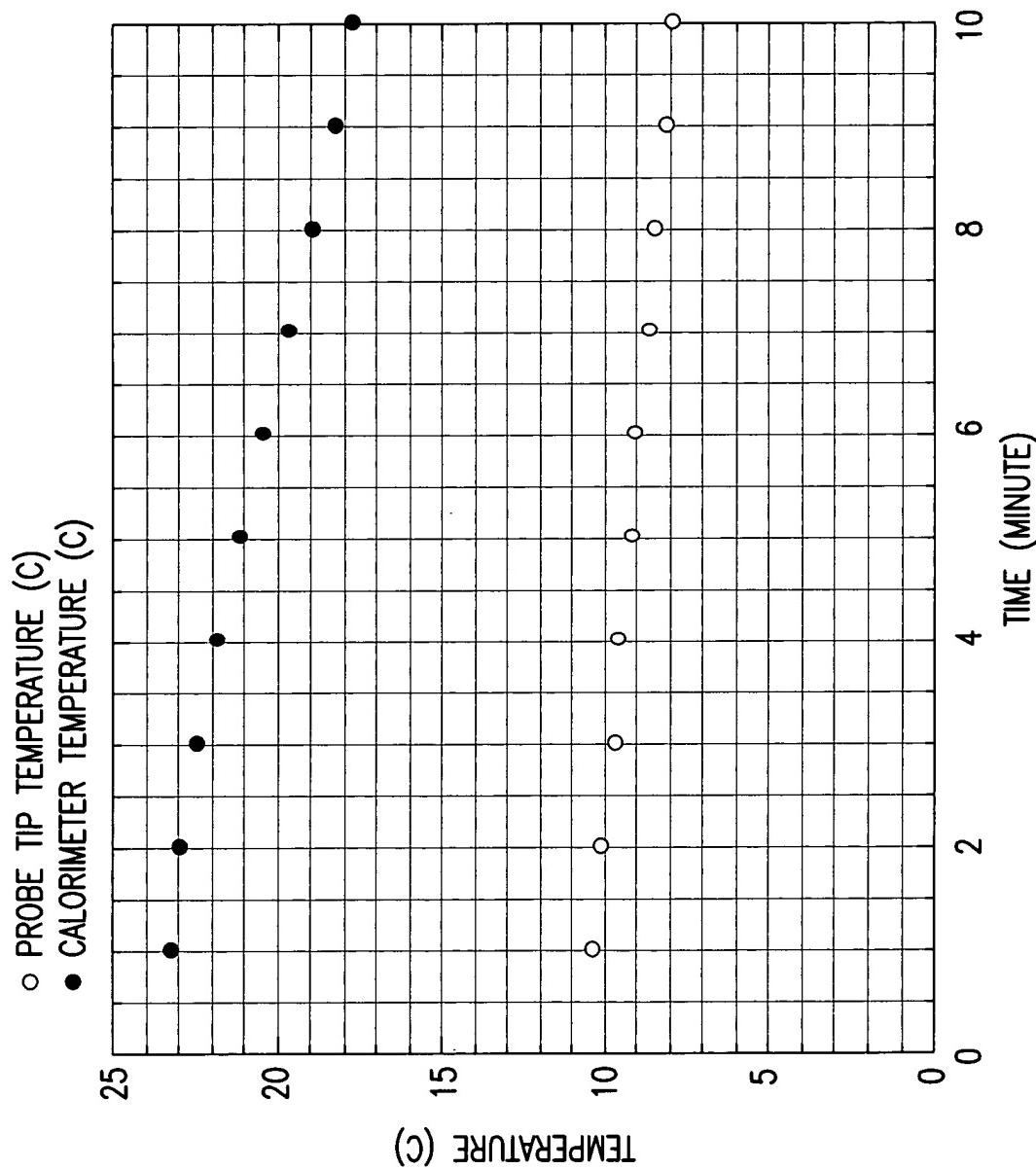
FIG. 10

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	Cooling time (s)=	300	600	900	1200
	Brain radius (m)=	0.055	0.055	0.055	0.055
	Brain volume (m³)=	0.000697	0.000697	0.000697	0.000697
	Brain mass (kg)=	0.752663	0.752663	0.752663	0.752663
	Required cooling capacity (W)= $m^*C_p^*DT=$	48.30	24.15	16.10	12.07
<i>Calorimetric Experiments</i>					
Time (minute)	Tip Temperature (C)	Calorimeter temperature (C)	Flow rate (mL/min)	Water (gram)	
1	10.4	23.3	23.3	170	50
2	10.2	23.0			
3	9.7	22.5			
4	9.6	21.9			
5	9.2	21.2			
6	9.1	20.5			
7	8.7	19.7			
8	8.5	19.0			
9	8.2	18.3			
10	8.0	17.8			
		Tf (C) =	16.1		
	Cooling capacity (W)= $m^*C_p^*DT=$	2.508			

FIG. 10-1

FIG. 11



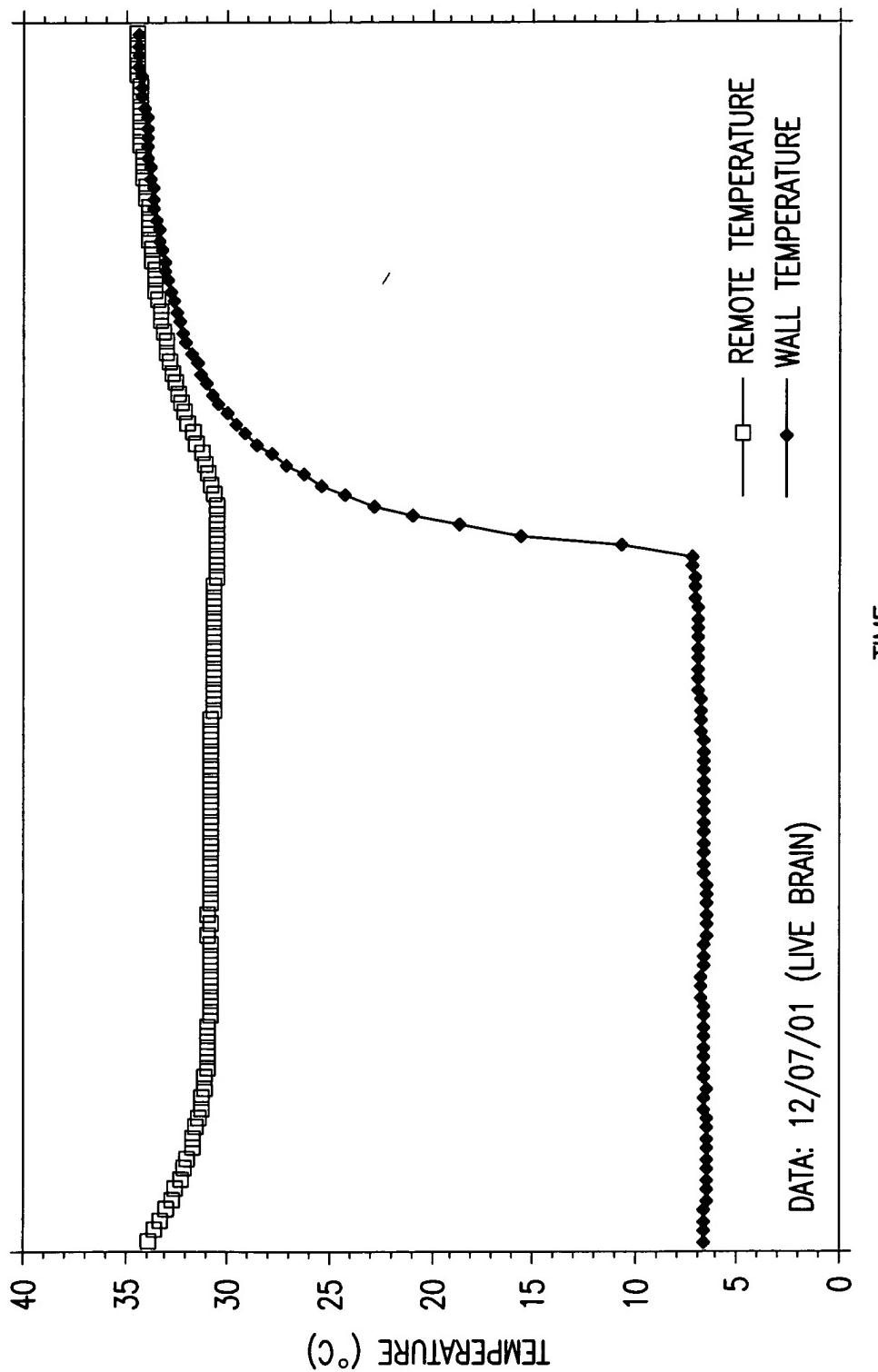


FIG. 12

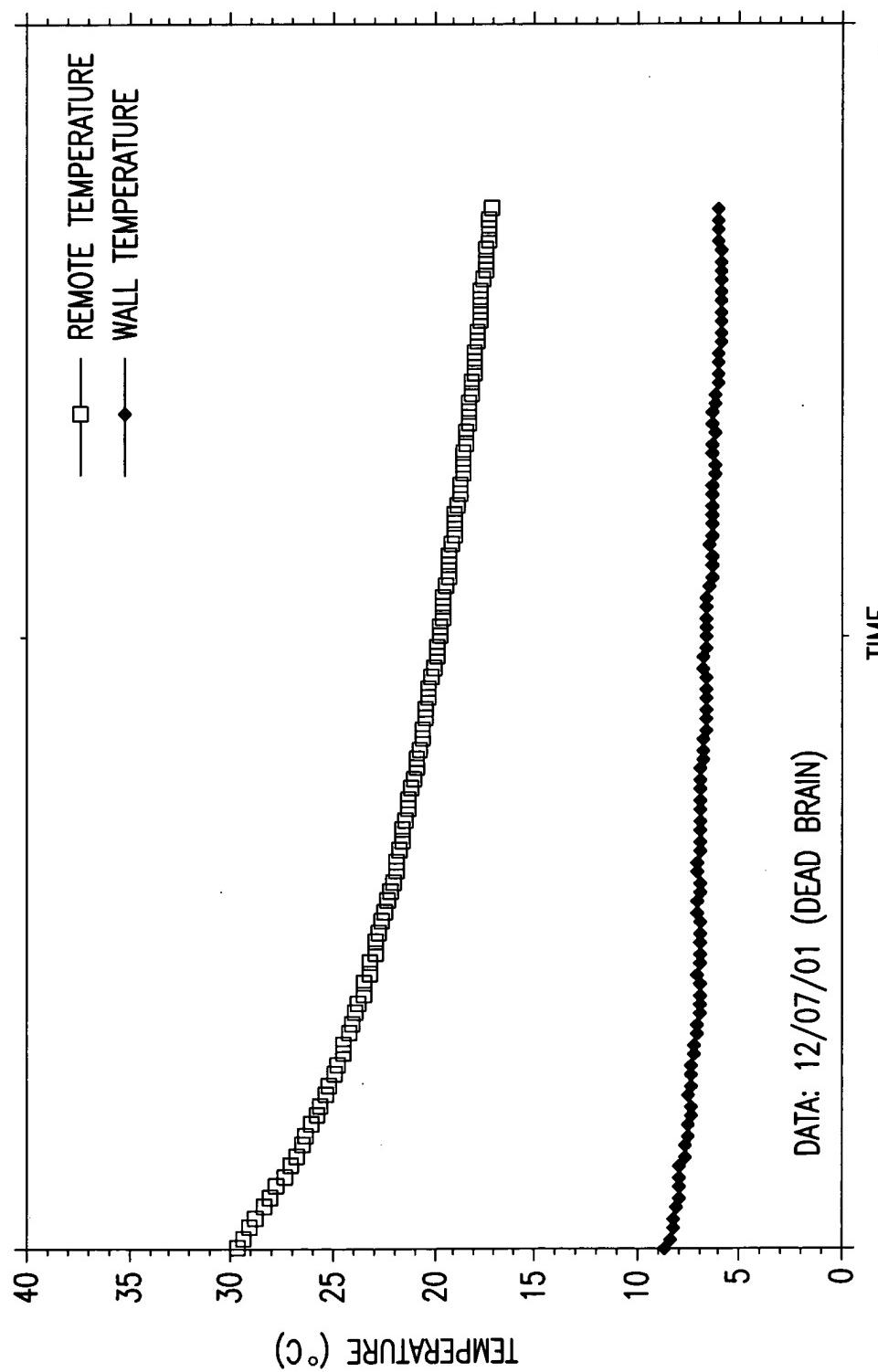


FIG. 13

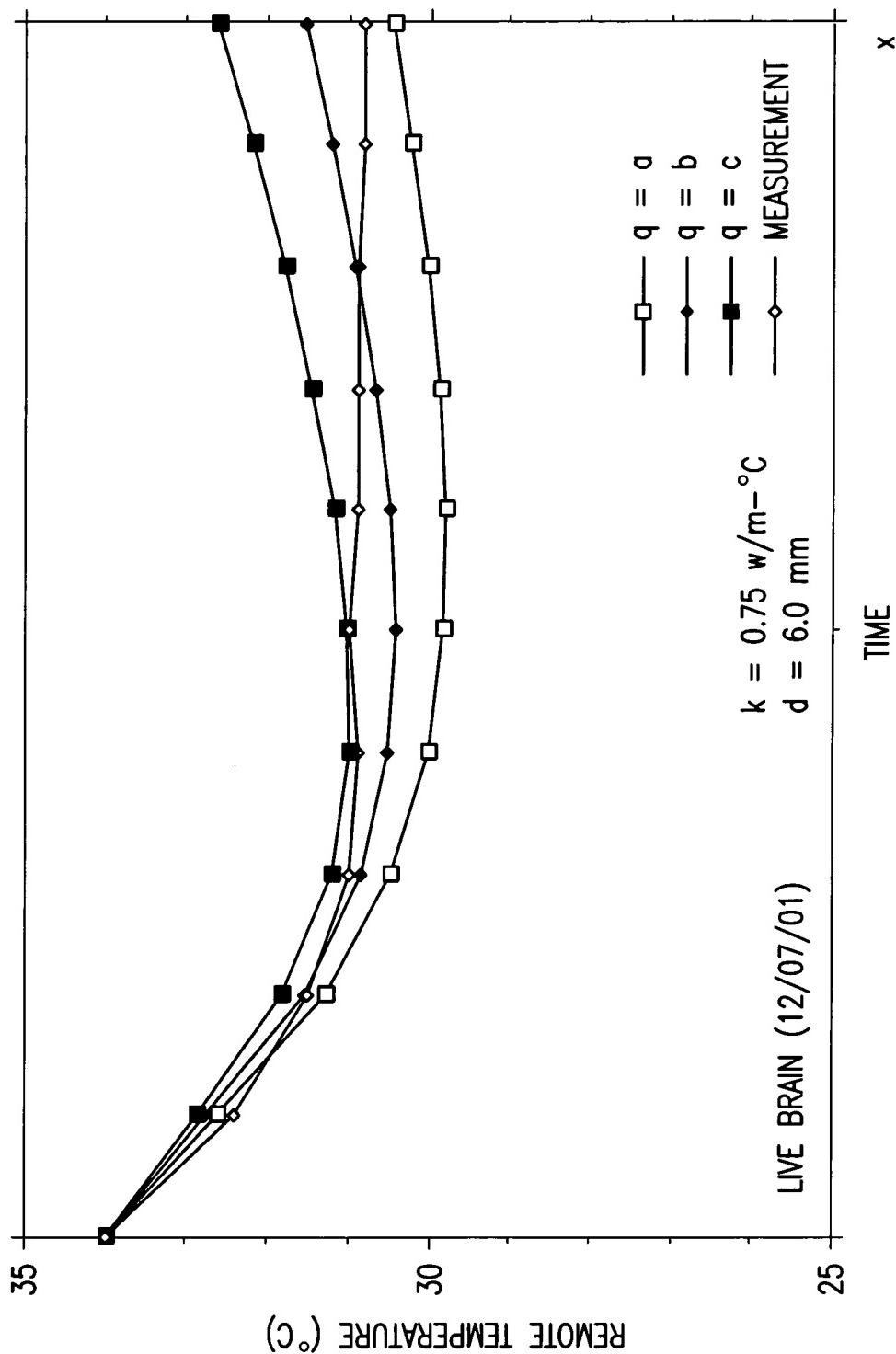


FIG. 14

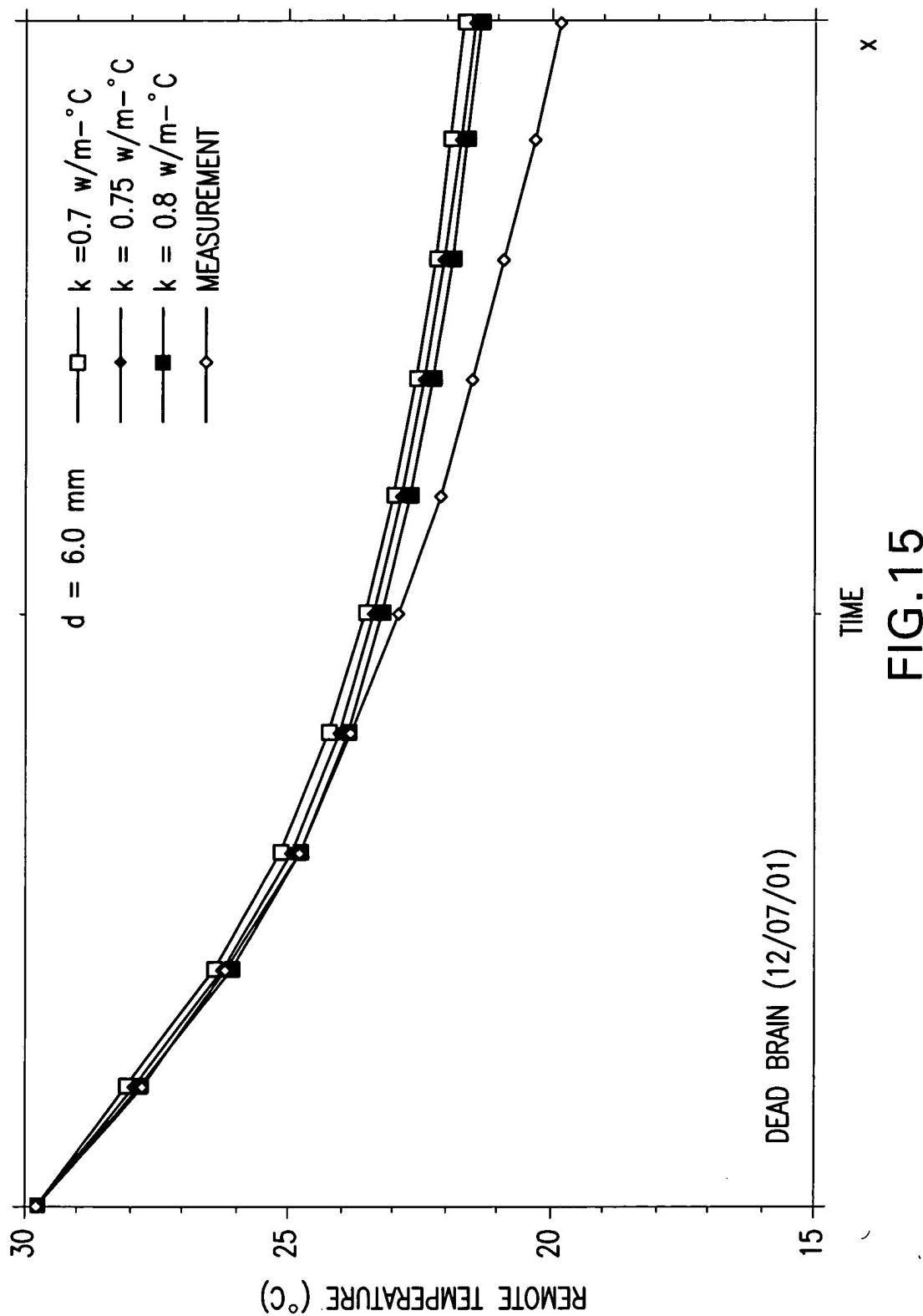


FIG. 15